

**SECTION 31 23 25**  
**CONTROLLED DENSITY FILL**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Portland cement
- B. Fly ash
- C. Air-entraining admixture
- D. Aggregate

**1.02 RELATED SECTIONS**

- A. Earthwork fill and backfill are specified in Section 31 00 00, Earthwork.
- B. Backfill for utility trenches is specified in Section 33 05 28, Trenching and Backfilling for Utilities.

**1.03 MEASUREMENT AND PAYMENT**

- A. General: Measurement and payment for controlled density fill will be by the lump-sum method or by the unit-price method as determined by the listing of the bid item for control density fill indicated in the Bid Schedule of the Bid Form.
- B. Lump Sum: If the Bid Schedule indicates a lump sum for controlled density fill, the lump-sum method of measurement and payment will be in accordance with Section 01 20 00, Price and Payment Procedures, Article 1.03.
- C. Unit Price: If the Bid Schedule indicates a unit price for controlled density fill, the unit-price method of measurement and payment will be as follows:
  - 1. Measurement: Except as specified otherwise in other Sections of these specifications or the Contract Specifications, control density fill will be measured for payment by the cubic yard, and quantities will be computed, based on the neat lines, section profiles, and dimensions indicated on the Contract Drawings.
  - 2. Payment: Controlled density fill will be paid for at the indicated Contract unit prices for the computed quantities as determined by the measurement method specified in Article 1.03.C.1, herein.

**1.04 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C33/C33M Standard Specification for Concrete Aggregates

2. ASTM C94/C94M Standard Specification for Ready-Mixed Concrete
3. ASTM C150/C150M Standard Specification for Portland Cement
4. ASTM C231/C231M Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
5. ASTM C260/C260M Standard Specification for Air-Entraining Admixtures for Concrete
6. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

#### **1.05 DEFINITION**

- A. Controlled Density Fill (CDF) is a flowable mixture of aggregate and cementitious material containing sufficient portland cement to develop a 28-day compressive strength of 50 to 150 psi, that self compacts upon backfilling placement.

#### **1.06 SUBMITTALS**

- A. General: Refer to Sections 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Mix Design: Submit controlled density fill mix design in accordance with applicable requirements of Section 03 05 15, Portland Cement Concrete.
- C. Test Sample: Provide test sample in accordance with applicable requirements of ASTM C231/C231M.

### **PART 2 – PRODUCTS**

#### **2.01 MATERIALS**

- A. Portland Cement: ASTM C150/C150M, Type I or Type II.
- B. Fly Ash: ASTM C618, Class F. Fly ash shall not inhibit air entrainment.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Aggregate: ASTM C33/C33M, graded aggregate, maximum size of 3/8 inch.
- E. Water: Potable.

## **2.02 MIX DESIGN**

- A. Requirements: Controlled density fill shall be composed of cementitious materials, aggregate, water, and an air-entraining admixture, as follows:
  - 1. Cementitious materials shall be portland cement in combination with fly ash.
  - 2. Admixture shall be an air-entraining agent.
- B. Aggregate Content: CDF mixture shall contain no aggregate larger than 3/8 inch. Amount passing a No. 200 sieve shall not exceed 12 percent. No plastic fines shall be present.
- C. Air Content: Total calculated air content of the sample, prepared in accordance with ASTM C231/C231M, shall not exceed 30 percent.
- D. Strength: Controlled density fill shall have an unconfined compressive strength at 28 days of 50 psi to a maximum of 150 psi.

## **PART 3 – EXECUTION**

### **3.01 MIXING AND DELIVERY**

- A. Controlled density fill shall be batched at a ready mixed plant and shall be mixed and delivered to the work site by transit mixing trucks in accordance with ASTM C94/C94M.

### **3.02 INSTALLATION**

- A. Controlled density fill material shall be placed in the excavations and trenches to be backfilled to the indicated elevations in level layers. Do not perform any vibratory consolidation or compaction.
- B. Equipment and traffic shall not be permitted on the controlled density fill until the surface of the CDF will withstand the weight of the equipment and traffic without displacement or damage.
- C. Provide steel trench plates to span trenches where required to provide passage for vehicles and other equipment.

**END OF SECTION 31 23 25**